

Claims

1. A method of controlling the viability of a plant cell or cells by contacting the plant cell or cells with a substance which directly or indirectly up- or down-regulates a cell death pathway in the cell or cells, which pathway is activatable by depleting the concentration of NTP in the external environment available to the cell or cells whose viability is to be controlled.
2. A method according to claim 1, wherein the pathway is activatable by depleting the concentration of ATP in the external environment available to the cell or cells.
3. A method of killing a plant cell or plant cells according to claim 1 or 2, by activating a cell death pathway, which pathway is activatable by depletion of extracellular NTP, especially ATP, available to the cell for utilization.
4. A method according to claim 3, wherein the plant cell or cells are present in a plant and performance of the method results in death of the plant or a part thereof.
5. A method according to claim 3 or 4, wherein the cell death pathway is activated by depletion of extracellular ATP available to the cell for utilization.
6. A method according to any one of claims 3, 4 or 5, comprising the step of bringing an active agent into contact with the extracellular environment of the cell or cells to be killed, wherein the agent hydrolyses extracellular NTP (especially ATP) and/or renders extracellular NTP (especially ATP) non-available to the plant cell or cells.
7. A method according to any one of the preceding claims, comprising the use of an NTP (especially an ATP) analogue and/or an ATPase inhibitor.
8. A method according to claim 7, wherein the NTP analogue is substantially non-hydrolysable by the plant extracellular NTPase (especially ATPase) enzymes.

9. A method according to any one of the preceding claims, comprising the use of a non-hydrolysable NTP analogue selected from the group consisting of: AMP-PCP, AMP-PNP, ATP- γ -S, GMP-PCP, GMP-PNP and GTP- γ -S.
10. A composition for controlling the viability of a plant cell or plant cells, the composition comprising an active agent which, directly or indirectly, up- or down-regulates in the cell or cells a cell death pathway, which pathway is activatable by depletion of extracellular NTP (especially ATP) available for utilization by the cell or cells.
11. A composition according to claim 10 comprising an inhibitor or antagonist of one or more of the polypeptides identified in Table 3 herein.
12. A composition according to claim 10, wherein the active agent is a substance which activates the cell death pathway.
13. A composition according to claim 10, 11 or 12, for use in the method of any one of claims 1-9.
14. A composition according to any one of claims 10-13, further comprising one or more components of conventional herbicidal compositions, selected from the group consisting of surfactants and penetration enhancers.
15. A method of controlling the viability of a plant cell or cells substantially as hereinbefore described.
16. A composition for killing a plant cell or cells substantially as hereinbefore described.
17. A method of preserving the viability of a plant cell or cells exposed to viability-threatening extracellular NTP depletion, the method comprising the step of administering a viability-preserving substance which has the effect, directly or indirectly, of increasing the extracellular NTP (especially ATP) concentration or

otherwise inhibiting the cell death pathway which is activatable by depletion of extracellular NTP (especially ATP) available to the cells.

18. A method according to claim 17, wherein the viability-preserving substance comprises a nucleotide sequence and/or the polypeptide(s) encoded thereby, the nucleotide sequence encoding a polypeptide which, when expressed in the plant cell, has the effect of tending to increase the extracellular concentration of NTP (especially ATP) so as to preserve the viability of the cell.
19. A method according to claim 18, wherein the nucleotide sequence is expressed constitutively in the plant cell.
20. A method according to claim 18, wherein the nucleotide sequence is expressed in the plant cell in response to a viability-threatening event.
21. A method of altering the viability of a plant or part thereof, the method comprising the step of introducing into the plant or part thereof a recombinant nucleic acid molecule comprising a sequence of at least 200 bases (preferably at least 300 bases, more preferably at least 400 bases) having at least 90% sequence identity with a sequence encoding one of the polypeptides listed in Table 3, operably linked in the sense or antisense orientation to a promoter active in a plant.
22. A method according to claim 21, comprising the use of two or more different sequences, each of at least 200 bases, each having at least 90% sequence identity with a respective different sequence encoding one of the polypeptides listed in Table 3.
23. A method according to claim 22, wherein each of the two or more sequences is present on a single nucleic acid construct.
24. A method according to any one of claims 21-23, wherein the promoter is inducible and/or a tissue-specific promoter.

25. A method according to any one of claims 21-23, wherein the introduced molecule directs the expression of an active polypeptide, so as to increase the concentration of the polypeptide (optionally in response to one or more specific stimuli) in the plant or part thereof.
26. A method according to any one of claims 21-23, wherein the introduced molecule directs the synthesis of a transcript which has an inhibitory effect (for example, as a result of antisense or RNAi interactions) on the expression of an endogenous gene present in the plant.
27. Use of a nucleic acid sequence as aforesaid in the preparation of a composition for the method of any one of claims 21-26.
28. A transgenic plant, or the progeny thereof, produced by the method of any one of claims 21-26.
29. Use of an ATP analogue and/or an ATPase inhibitor as an active agent in the preparation of a herbicidal composition.
30. A use according to claim 29, wherein the ATP analogue is non-hydrolysable.
31. Use of an inhibitor of any one of the polypeptides identified in Table 3 as an active agent in the preparation of a composition to alter the viability of a plant.
32. Use according to claim 31, wherein the composition is a herbicidal composition.
33. Use according to claim 31, wherein the composition is a viability-preserving composition.